# ECONOMIC ASPECTS OF SALVAGING BEETLE-KILLED PONDEROSA PINE.

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The killing of ponderosa pine timber by insects, primarily dendroctonus beetles, has been a significant problem to timber owners for nearly fifty years. Throughout this long period the approach to the problem has been one of reducing the colonies of insects. The development of the logging tractor and more efficient pneumatic-tired trucks have introduced greater flexibility into the logging process. This in turn has made possible the utilization of smaller stand volumes than obtained with donkey logging and railroad transportation. The net result has been the economic feasibility of utilizing beetle-killed trees while at the same time reducing the colonies of insects.

Most of our attention in the past has been directed toward stands in which the insect infestation has reached epidemic proportions. It is the purpose of this conference today to consider endemic infestations and the possibilities, through their control, of preventing epidemic infestations. Under these conditions much smaller volumes are available in the salvaging process. In considering the economic aspects of salvaging beetle-killed trees during the endemic phases, it has been necessary to utilize data from several sources. The data cover studies of beetle-killed timber, grade-recovery studies of ponderosa pine not killed by beetles, and time-study analyses of logging operations. The synthesis of this material from several sources and from studies separated in time may be viewed as somewhat hypothetical. However, it is felt that for the purposes desired, the data herewith presented are not illogical or unfounded.

In salvaging insect-killed trees of endemic proportions we are confronted with two aspects of the problem, a reduction in value of our final product through blue-staining and an increase in logging costs due to the small volume involved.

A study of beetle-killed ponderosa pine was made in 1935, on the Fruit Growers Supply Company timber sale area. An analysis of the beetle-killed timber prepared by Mr. J. R. Berry of the U. S. Forest Service showed that trees killed or in the process of being killed by broods of dendroctonus beetles from the previous summer and winter contained up to 44% of blue-stained lumber. Trees with current broods of insects had only 12% of their volumes in blue-stained lumber.

In the table of data presented herewith it is assumed that the average size of a beetle-killed tree is 32" d.b.h. The value of the lumber derived from this average tree is presented at $85.00 per M ft. This figure was arrived at by applying F.O.B. mill prices for January 1949 to the volumes of lumber grades encountered. The F.O.B. mill prices were adjusted conservatively heavy for reduction in price due to blue-staining. In this process it was assumed that 40% of the volume of the tree is blue-stained and that all of this staining occurs in the select and shop grades of lumber. The final price represents a weighted average.

The F.O.B. mill price obtained is for dry, surfaced lumber. In carrying this value back to the woods, no adjustment has been made from lumber tally to log scale. It is assumed that the 32" tree has 1765 board feet of lumber gross scale and that the cull is offset by mill overrun. On the cost side of the picture, it is assumed also that all variation in cost based on volume of stand removed, will be confined to those operations up to the point of

transportation from the woods to the mill. The total cost for surfacing, milling, yard handling, sales, general overhead and woods to mill transportation is calculated to be $38.60 per M ft. This leaves a net of $46.40 per M ft. available for delivery of logs to the transfer point, stumpage and profit.

In calculating the costs of the woods operations shown in the table, four conditions were assumed: (1) the salvaging of 10 trees per 40 acres with a cost for road of approximately $500 per mile, (2) 10 trees per 40 acres and road cost of $3000 per mile, (3) one tree per acre and road cost of $500 per mile, and (4) one tree per acre and road cost of $3000 per mile. In all four conditions it is assumed that the light cuts will justify only a small amount of road construction. A figure of four feet of road per acre was used. This is based on an approximate maximum yarding distance of one mile or an average yarding distance of about 3200 feet.

In arriving at the variation in cost for felling, limbing and bucking data were used from previous time studies. Due allowance was made for the larger percentage of time spent walking from tree to tree. It was assumed that the yarding and loading costs would remain the same on a daily basis for both intensities of cutting, but that the heavier of the two cuts per acre would permit writing off the daily cost against a larger volume. The only effect on woods transportation cost is through the effect of changes in volume on the cost of ~~wood~~ road construction.

In making the conclusions which follow it is assumed that the timber stand, including land, is owned by the operator. Any other assumption introduces factors more difficult of analysis. From the amounts shown in the table as available for stumpage and profit, it may be concluded that:

1. For gentle to moderate topography the salvaging of even ~~light~~ light ~~infestation~~ volume of beetle-killed trees is economically feasible under current market conditions.

2. The cost of road construction has a pronounced effect on the cost of transportation of logs. Therefore in very rough topography, the building of roads solely to salvage light cuts of beetle-killed trees may introduce prohibitive costs.

3. For the long range management of forest property high-risk logging offers an approach to the problem of endemic insect infestations, which deserves the most careful consideration by timber operators. A volume per acre is removed, much greater than has been contemplated here. It is difficult to conceive of any condition where, even under a marked reduction in present market prices, the practice would introduce prohibitive costs. Trees susceptible to insect damage can be removed along with those already infested. With the road system once completed the operator has the opportunity for future salvage work, whether the trees be killed by insects or fire. Or if trees of certain sizes or quality classifications command a premium price for even a short period, it is possible to take advantage of this special market.

NOTE: This paper was presented at the Insect Detection "Schools" sponsored by the Western Pine Association at Sacramento and Redding, California, on June 26 and June 28, 1951, respectively.

Per M.

# COSTS AND VALUES OF LUMBER IN A 32" PONDEROSA PINE TREE 1/

| Item | 10 trees per 40 | | 40 trees per 40 | |
|---|---|---|---|---|
| | Road Cost $500 per mi. | Road Cost $3000 per mi. | Road Cost $500 per mi. | Road Cost $3000 per mi. |
| 2/ | | | | |
| F.O.B. mill price - dry surfaced lumber | 85.00 | 85.00 | 85.00 | 85.00 |
| Cost - general overhead, milling, surfacing, transportation woods to mill, etc. (current cost) | 38.60 | 38.60 | 38.60 | 38.60 |
| Net - available for logging, stumpage and profit | 46.40 | 46.40 | 46.40 | 46.40 |
| Logging costs: | | | | |
| Felling, limbing and bucking | 4.50 | 4.50 | 4.00 | 4.00 |
| Yarding and loading | 7.20 | 7.20 | 5.20 | 5.20 |
| Transportation in woods | 4.35 | 9.00 | 3.65 | 4.80 |
| Supervision | 1.00 | 1.00 | 1.00 | 1.00 |
| Total | 17.05 | 21.70 | 13.85 | 15.00 |
| Net available for stumpage and profit | 29.35 | 24.70 | 32.55 | 31.40 |

1/ Beetle-killed tree containing 1765 bd. ft. gross scale. 40% of lumber blue-stained.

2/ Prices for blue-stained selects reduced 18% and for blue-stained shops 10%.